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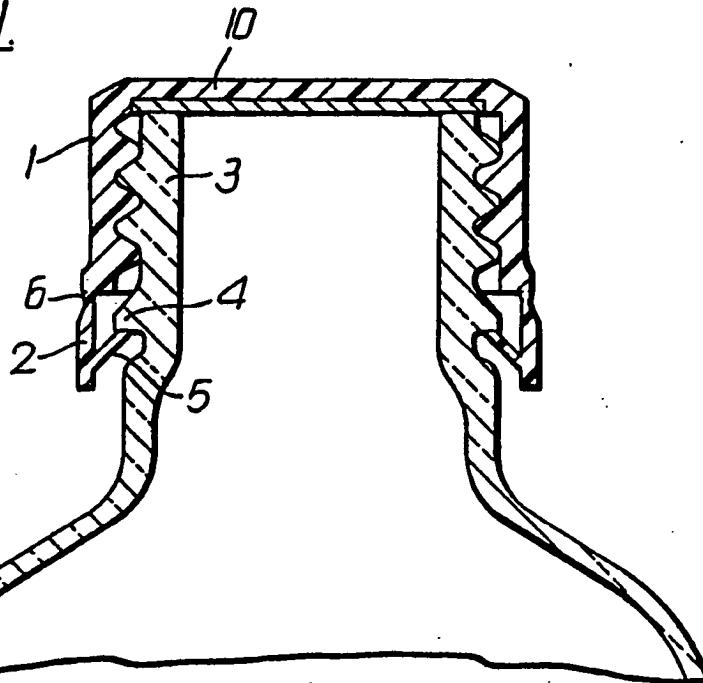
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(54) Tamperproof closure

(57) The skirt of a container cap  
comprises an upper skirt portion 1 of  
relatively rigid plastics material joined  
at its lower margin to a lower skirt  
portion 2 of relatively flexible plastics  
material, the lower skirt portion having  
means 5 directed inwardly therefor for

engaging an outwardly-directed  
feature 4 on the neck of the container,  
said engagement tending to resist  
axial movement of the lower skirt  
portion in a direction removing the cap  
from the container. The inwardly-  
directed means may be an annular  
flange or an annular series of spaced  
fingers directed towards the top of the  
cap.

*Fig.1*



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Fig.1

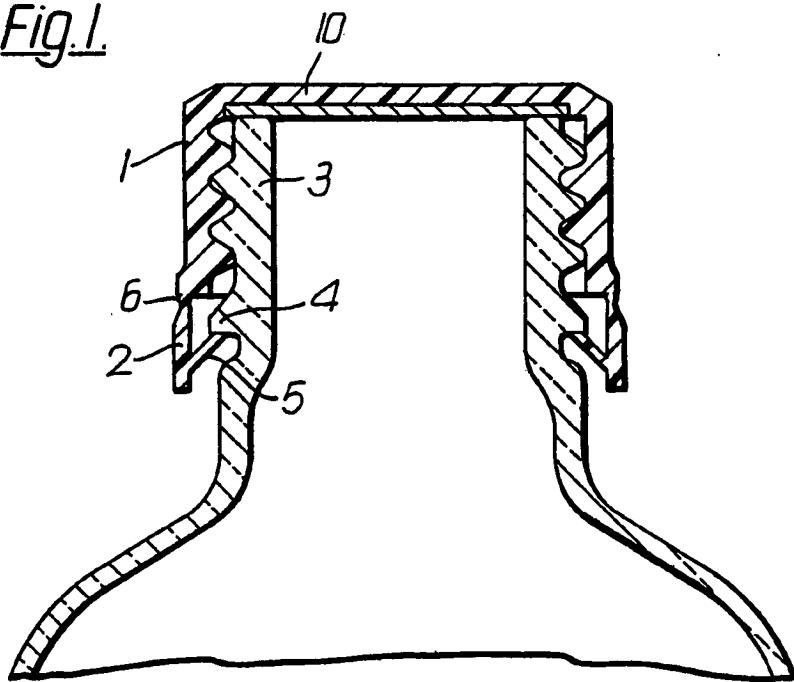
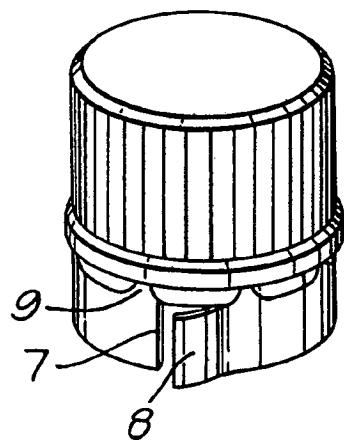


Fig.2



**SPECIFICATION**  
**Tamperproof closure**

This invention relates to closures for containers, and especially to a closure of the tamperproof variety.

- 5 Tamperproof closures are well known. They are normally made of metallic material, for example aluminium or tinplate, and comprise an upper skirt portion separated from a security ring by a series of spaced bridges. When the closure is applied to a container, the upper skirt portion is conformed to thread formed in the container neck, and the security band is crimped beneath an annular bead or rib formed below the thread. When the upper skirt portion of the cap is removed from the container by unscrewing, the joining bridges break and the security ring remains on the container. This is a visual indication that the cap has been removed from the container.
- 10 Attempts have been made in the recent past to produce tamperproof closures from plastics materials, and these have been made in a generally similar manner to the metal tamperproof closures described above, save for the fact that
- 15 the upper skirt portion in a plastics closure has a pre-formed thread for engagement with the threaded portion of the container neck. The lower skirt portion, or security ring, of these plastics closures is normally thermally deformed or heat-shrunk into place beneath the co-operating bead on the container.
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One disadvantage of metal tamperproof closures of the above-described type is that the security ring which remains on the container has a sharp and therefore potentially dangerous edge. The plastics tamperproof closure is much better in this respect, but has the defect that if the top of the closure and the upper skirt portion thereof are too resilient the top and upper skirt portion may not be sufficiently rigid to combat changes of pressure within the container, e.g. in those instances where carbonated beverages are involved.

It is an object of the present Invention to provide a cap for a container which is of the tamperproof variety and which does not suffer from the disadvantages encountered with metal and plastics tamperproof caps known hitherto.

According to the present Invention a cap for a container comprises a top and a peripherally depending skirt, the skirt comprising an upper skirt portion of relatively rigid plastics material joined at its lower margin to a lower skirt portion of relatively flexible plastics material, the lower skirt portion having means directed inwardly thereof for engaging an outwardly directed feature on the neck of the container, said engagement tending to resist axial movement of the lower skirt portion in a direction removing the cap from the container.

In a preferred embodiment the inwardly directed means on the lower skirt portion of the cap comprises either an annular flange directed not only inwardly but upwardly towards the top of the cap; or a series of spaced fingers similarly

65 directed.

Preferably also the upper skirt portion of the cap, which is rigid relative to the lower skirt portion, together with the top thereof, is formed of a thermosetting plastics material or a rigid or

- 70 semi-rigid thermoplastics material, the lower skirt portion being formed of a thermoplastics material. Thus, the upper skirt portion may be formed of rigid or semi-rigid polystyrene, polyethylene or polypropylene, suitably rigid polystyrene; the
- 75 lower skirt portion, less rigid than the upper skirt portion, may be made of a similar material, but is preferably of impact-modified polystyrene.

Although the lower skirt portion is relatively less rigid than the upper skirt portion it may

- 80 nevertheless have a degree of rigidity, and indeed it must clearly not be too flexible since otherwise the proper application of the cap to a container would be impossible. Other suitable materials for forming the upper part of the cap include phenolic
- 85 and amino resins, specifically phenol-formaldehyde resins, urea-formaldehyde resins and melamine-formaldehyde resins.

The upper and lower skirt portion are preferably joined by welding (e.g. ultrasonic, friction or

- 90 thermal welding), and the joint may comprises a thin annular web of thermoplastics material or a series of spaced bridges of thermoplastics material, preferably integrally formed with the lower skirt portion. The upper and lower portions
- 95 of the cap may alternatively be joined by means of suitable adhesives.

The upper rigid part of the cap is suitably provided with means engaging co-operating means on the container neck. That is to say, the upper skirt portion may be provided interiorly with a single- or multi-start thread which engages a complementary thread on the container neck.

Beneath the thread on the container neck is preferably an annular outstanding bead or rib, beneath which is engaged the engaging means on the lower skirt portion of the cap.

The lower skirt portion may, if desired, itself provide or be provided with a tear-tab, whereby the lower skirt portion of the cap may be removed from the container before the upper skirt portion of the cap can be removed.

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In manufacturing a cap according to the Invention, the upper part of the cap is formed by an injection or compression-moulding process, and the lower skirt portion by an injection process. The two skirt portions of the cap are then joined together, e.g. by ultrasonic thermal or friction welding or adhesive bonding.

The accompanying drawings illustrate two embodiments of the present invention.

Figure 1 is a part-sectional view of a cap according to the invention applied to a container, e.g. of glass or a thermoplastics material. The cap comprises a circular top 10 and a peripherally depending skirt comprising an upper skirt portion 1 and a lower skirt portion 2. Upper skirt portion 1 is provided with an internal thread for threaded engagement with the neck 3 of a bottle. Upper skirt portion 1 is integrally formed with top 10 by

means for example of an injection or compression moulding process, from a relatively rigid plastics material. Security ring 2 is formed from a more flexible plastics material, e.g. polystyrene.

5 polyethylene or polypropylene, by an injection moulding process, and is then attached to the lower margin of upper skirt portion 1 by a continuous web or a series of spaced bridges 6.

Formed integrally with the lower skirt portion 2

10 is an inwardly directed annular rib 5. This may alternatively comprise a series of circumferentially spaced fingers. It will be seen from Figure 1 that such web or fingers engage beneath an annular bead 4 on the container neck.

15 The cap is applied to the neck of the container by a simple screwing procedure. As the cap is screwed on to the container, the lower skirt portion 2 flares outwardly as the web or fingers 5 passes over the bead 4, and then reverts to size as

20 the web or fingers 5 snap beneath the said bead. Figure 1 shows the closure fully applied to the container. When the cap is rotated to unscrew it from the container, the engagement between the web/fingers 5 and the bead 4 causes the lower skirt portion 2 to remain on the container. The upper skirt portion 1 being removed axially from the container by an unscrewing motion, the bridges or web 6 breaks, thus allowing the upper part of the cap to be removed and the lower skirt portion to remain on the container neck.

25 In the embodiment shown in Figure 2 the lower skirt portion is provided with a split 7 parallel to the axis of the closure. Either side of this split then constitutes a tear-tab, which may be grasped and pulled, thus breaking the bridges 6 and separating the upper skirt portion of the cap from the lower skirt portion. The lower skirt portion of the cap of Figure 2 will have approximately the same configuration as the lower skirt portion 2 of Figure

30 1, whereby unscrewing of the cap is prevented until such time as the lower skirt portion is removed, by tearing in this case, from the upper skirt portion.

In accordance with a modification of the

35 present invention there is provided a synthetic plastics cap for a container comprising a top and a peripherally depending skirt, the skirt comprising an upper skirt portion joined at its lower margin through a frangible connection to a lower skirt portion having means directed inwardly thereof for engaging an outwardly directed feature on the neck of the container, said engagement tending to resist axial movement of the lower skirt portion in a direction removing the cap from the container,

40 50 the lower skirt portion being formed separately from the rest of the cap and thereafter attached thereto.

55 As with the main invention the upper and lower skirt portions of this modification are suitably joined through a thin annular web of material or by means of spaced frangible bridges. The inwardly directed feature may again be a continuous annular bead or a series of circumferentially arranged fingers adapted to bear against the

60 65 underside of an annular bead formed on the

container neck.

In contrast to the main invention, however, the upper and lower skirt portions may be made of similar plastics material although it is preferred

70 that the upper skirt portion should be of a more rigid material than the lower portion. Thus, both parts of the cap are suitably made from polystyrene, e.g. unmodified polystyrene for the upper part and impact-modified polystyrene for the lower skirt portion. The lower portion may be made in a differently coloured material from the upper part.

In all aspects of the invention it is preferred that the inside diameter of the inwardly directed web

80 or fingers on the lower skirt portion and the diameter of the crests of the thread formed on the upper skirt portion should be substantially the same, i.e. to within about 10%.

#### CLAIMS

85 1. A cap for a container comprising a top and a peripherally depending skirt, the skirt comprising an upper skirt portion of relatively rigid plastics material joined at its lower margin to a lower skirt portion of relatively flexible plastics material, the lower skirt portion having means directed inwardly thereof for engaging an outwardly-directed feature on the neck of the container, said engagement tending to resist axial movement of the lower skirt portion in a direction removing the cap from the container.

90 2. A cap according to claim 1 wherein said inwardly-directed means comprises an annular flange directed towards the top of the cap.

95 3. A cap according to claim 1 wherein said inwardly-directed means comprises an annular series of spaced fingers each directed towards the top of the cap.

100 4. A cap according to claim 1, 2 or 3 wherein the upper skirt portion is formed from a thermosetting plastics material or a rigid or semi-rigid thermoplastics material.

105 5. A cap according to claim 4 wherein the upper skirt portion is formed from rigid or semi-rigid polystyrene, polyethylene or polypropylene.

110 6. A cap according to any of claims 1 to 5 in which the lower skirt portion is formed from impact-modified polystyrene.

115 7. A cap according to any of claims 1 to 6 in which the upper and lower skirt portions are joined together by welding.

120 8. A cap according to any of claims 1 to 7 in which the joint between the upper and lower skirt portions comprises an annular web of thermoplastics material or a series of spaced bridges of thermoplastics material.

125 9. A cap according to claim 8 wherein said annular web or said series of bridges is or are formed integrally with said lower skirt portion.

10. A cap according to any of claims 1 to 9 wherein the lower skirt portion provides or is provided with a tear-tab.

11. A synthetic plastics cap for a container comprising a top and a peripherally depending skirt, the skirt comprising an upper skirt portion

joined at its lower margin through a frangible connection to a lower skirt portion having means directed inwardly thereof for engaging an outwardly-directed feature on the neck of the  
5 container, said engagement tending to resist axial movement of the lower skirt portion in a direction

removing the cap from the container.

12. A cap according to claim 11 wherein the lower skirt portion is made separately from the rest of the cap and is thereafter attached thereto.
13. A cap for a container, substantially as described with reference to the drawings.

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